

CLAIMS

What is claimed is:

1. A medical retrieval device comprising:
a handle;

an actuator having an axis of rotation and being mounted
to said handle for rotational movement with respect
thereto; and

a basket having at least three legs, an adjacent two of
said legs being connected to a first location on said
actuator radially spaced apart from said axis of rotation,
and the remainder of said legs being connected to a
second location on said actuator radially spaced apart
from said axis of rotation such that rotation of said
actuator displaces said two legs in a first direction with
respect to said sheath and displaces the remainder of
said legs in a second direction different from said first
direction.

2. The medical retrieval device of Claim 1, further
comprising a slide attached to said handle for longitudinal
movement with respect thereto along a path between a rearward
location and a forward location,

wherein said actuator is rotatably mounted to said handle
by said actuator being rotatably mounted to said slide
which in turn is mounted to said handle.

3. The medical retrieval device of Claim 2, further comprising:

a hollow sheath fixedly mounted to and extending forward from said handle, said sheath having a forward end, and said basket being located at a forward end of said sheath,

said basket being operatively associated with said slide such that said basket is retracted within a forward portion of said sheath when said slide is in said rearward location, and said basket being extended forward of said forward end of said sheath when said slide is in said forward location;

whereby longitudinal movement of said slide extends and retracts said basket.

4. The medical retrieval device of Claim 1, further comprising:

a slide attached to said handle for longitudinal movement with respect thereto along a path between a rearward location and a forward location,

a hollow sheath mounted to said slide and extending forward from said handle, said sheath having a forward end, and said basket being located at a forward end of said sheath,

said sheath being operatively associated with said slide such that said sheath is retracted to expose said basket when said slide is in said rearward location, and said sheath being extended forward to cover said basket when said slide is in said forward location;

whereby longitudinal movement of said slide extends and retracts said sheath.

5. The medical retrieval device of Claim 1,
wherein prior to said actuator being rotated, said two
legs are separated by a first distance; and
wherein when said actuator is operated to displace said
two legs in a direction away from said actuator, said
two legs are separated by a second distance greater than
said first distance.

6. The medical retrieval device of Claim 1, further
comprising a wheel operatively associated with said actuator
such that rotation of said wheel rotates said actuator to displace
said basket legs.

7. The medical retrieval device of Claim 3, further
comprising a pair of tubes telescopically disposed within said
sheath, a first one of said pair of tubes being connected to said
first location on said actuator, and a second one of said pair of
tubes being connected to said second location on said actuator,
and wherein said adjacent two basket legs are connected to said
first location on said actuator by said adjacent two basket legs
being connected to a forward end of said first tube, and
wherein said remainder of said basket legs are connected to
said second location on said actuator by said remainder of said
basket legs being connected to a forward end of said second
tube.

8. The medical retrieval device of Claim 1, wherein
said actuator comprises a drum.

9. The medical retrieval device of Claim 8, wherein
said drum comprises a cylindrical wall, and wherein said first
and second locations on said drum are located on said
cylindrical wall.

10. The medical retrieval device of Claim 7,
wherein said actuator comprises a drum having a
cylindrical outer wall;
wherein said first and second locations on said drum are
located on said cylindrical wall;
wherein said drum comprises passages in said cylindrical
wall at said first and second locations;
wherein said first one of said pair of tubes is connected
to said first location on said drum by a first cable
having a first end connected to said first one of said
pair of tubes and a second end inserted into said
passage at said first location; and
wherein said second one of said pair of tubes is
connected to said second location on said drum by a
second cable having a first end connected to said
second one of said pair of tubes and a second end
inserted into said passage at said second location.

11. The medical retrieval device of Claim 8, wherein
said drum comprises an end wall, and wherein said first and
second locations on said drum are located on said end wall.

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12. The medical retrieval device of Claim 3,
wherein said rotary actuator comprises a drum having an
end wall;
5 wherein said first and second locations on said drum are
located on said end wall;
wherein said drum comprises passages on said end wall
at said first and second locations;
wherein each of said pair of tubes comprises a laterally
projecting pin at a rearward end thereof;
10 wherein said first one of said pair of tubes is connected
to said first location on said drum by said pin of said
first tube being inserted into said passage at said first
location; and
wherein said second one of said pair of tubes is
15 connected to said second location on said on said drum
by said pin of said second tube being inserted into said
passage at said second location.

13. The medical retrieval device of Claim 3,
20 wherein said rotary actuator comprises a drum having an
end wall;
wherein said first and second locations on said drum are
located on said end wall;
wherein said drum comprises pins projecting from said
25 end wall at said first and second locations;
wherein said first one of said pair of tubes is connected
to said first location on said drum by a first hook
attached to said first one of said pair of tubes and
hooked to said pin at said first location; and
30 wherein said second one of said pair of tubes is
connected to said second location on said drum by a
second hook attached to said second one of said pair of
tubes and hooked to said pin at said second location.

14. A medical retrieval device comprising:

a handle;

a hollow sheath extending forward from said handle, said sheath having a forward end;

5 a slide attached to said handle for longitudinal movement with respect thereto along a path between a rearward location and a forward location; and

10 a basket located at a forward end of said sheath, said basket having at least three legs, two of said legs comprising a continuous loop lying in a plane, said ends of said loop being operatively connected to said slide, and a third leg having a forward end joined to said continuous loop at an intermediate location thereon and a rearward end being operatively
15 connected to said slide, all of said legs of said basket are located on one side of said plane defined by said continuous loop;

20 said basket being retracted within a forward portion of said sheath when said slide is in said rearward location, and said basket being extended forward of said forward end of said sheath when said slide is in said forward location, whereby longitudinal movement of said slide extends and retracts said basket.

25 15. The medical retrieval device of Claim 14, wherein said basket further comprises a fourth leg, said fourth leg having a forward end joined to said continuous loop at an intermediate location thereon and a rearward end being operatively connected to said slide, and said fourth leg being
30 located on said one side of said plane defined by said continuous loop.

16. The medical retrieval device of Claim 14, wherein said loop comprises a first loop, and wherein said third and fourth legs comprise a second continuous loop, said forward ends of said third and fourth legs comprising a midpoint on said second continuous loop, and said ends of said second continuous loop being operatively connected to said slide.

17. The medical retrieval device of Claim 14, wherein said first and second legs are substantially flat in cross-section, and wherein said third and fourth legs are substantially round in cross-section.

18. The medical retrieval device of Claim 14, wherein said first and second legs are substantially round in cross-section, and wherein said third and fourth legs are substantially flat in cross-section.

19. The medical retrieval device of Claim 16, wherein prior to said actuator being rotated, said third and fourth legs are separated by a first distance; and wherein when said actuator is operated to displace said third and fourth legs in a direction away from said actuator, said third and fourth legs are separated by a second distance greater than said first distance.

20. A method for retrieving material from a body, comprising:

5 inserting a medical retrieval device into a body, the device comprising a handle, a hollow sheath extending forward from said handle, said sheath having a forward end, a slide attached to said handle for longitudinal movement with respect thereto along a path between a rearward location and a forward location, a rotary actuator having an axis of rotation generally transverse to said path of movement of said slide and being mounted to said slide for rotational movement with respect thereto, and a basket located at said forward end of said sheath, said basket having at least three legs, an adjacent two of said legs being connected to a first location on said rotary actuator radially spaced apart from said axis of rotation, and the remainder of said legs being connected to a second location on said rotary actuator radially spaced apart from said axis of rotation and being on an opposite side of said axis of rotation from said first location such that rotation of said rotary actuator displaces said two legs in a first direction with respect to said sheath and displaces the remainder of said legs in a direction opposite said first direction, said basket being retracted within a forward portion of said sheath when said slide is in said rearward location, and said basket being extended forward of said forward end of said sheath when said slide is in said forward location;

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30 longitudinally advancing said slide with respect to said handle to extend said basket;

maneuvering said basket to surround the material by rotating said rotary actuator to move at least one of said legs independently from at least one of said other legs;

longitudinally retracting said slide with respect to said handle to retract said basket to grasp the material with the legs of the basket; and withdrawing said device from the body to remove the grasped material from the body.

21. A medical retrieval device comprising:
a handle;

an actuator having an axis of rotation and being mounted to said handle for rotational movement with respect thereto; and

a basket having at least three legs, an adjacent two of said legs being connected to a location on said actuator radially spaced apart from said axis of rotation such that rotation of said actuator displaces said two legs with respect to said handle, and the remainder of said legs being connected to said handle in fixed relation to said actuator.

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22. The device of Claim 21, further comprising:
a slide attached to said handle for longitudinal movement
with respect thereto along a path between a rearward
location and a forward location;
5 wherein said actuator being mounted to said handle for
rotational movement with respect thereto comprises
said actuator being mounted to said slide for rotational
movement with respect thereto; and
wherein the remainder of said legs being connected to
10 said handle in fixed relation to said actuator comprises
said legs being connected to said slide.

23. The device of Claim 22, further comprising a
hollow sheath extending forward from said handle, said sheath
15 having a forward end; said basket being retracted within a
forward portion of said sheath when said slide is in said
rearward location, and said basket being extended forward of
said forward end of said sheath when said slide is in said
forward location.

24. The medical retrieval device of Claim 23, further
comprising a pair of tubes telescopically disposed within said
sheath, a first one of said pair of tubes being connected to said
location on said actuator, and a second one of said pair of tubes
25 being connected to said location on said slide, and wherein said
adjacent two basket legs are connected to said location on said
actuator by said adjacent two basket legs being connected to a
forward end of said first tube, and wherein said remainder of
said basket legs are connected to said location on said slide by
30 said remainder of said basket legs being connected to a forward
end of said second tube.

25. The medical retrieval device of Claim 21, further comprising a wheel operatively associated with said actuator such that rotation of said wheel rotates said actuator to displace said basket legs.

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26. The medical retrieval device of Claim 21, wherein said rotary actuator comprises a drum.

27. A medical retrieval device comprising:

a handle;

a slide attached to said handle for longitudinal movement with respect thereto along a path between a rearward location and a forward location;

a basket having at least three legs; and

means movably mounted to said slide and operatively associated with at least one of said basket legs for effecting translational movement of said at least one of said basket legs with respect to said slide.

28. The medical retrieval device of Claim 27, wherein said means movably mounted to said slide and operatively associated with at least one of said basket legs for effecting translational movement of said at least one of said basket legs with respect to said slide comprises a hub operatively associated with at least one of said basket legs and mounted to said slide for movement with respect thereto,

whereby moving said hub with respect to said slide translates said at least one of said basket legs with respect to said slide.

29. The medical retrieval device of Claim 27, wherein said means movably mounted to said slide and operatively associated with at least one of said basket legs for effecting translational movement of said at least one of said basket legs with respect to said slide comprises means movably mounted to said slide and operatively associated with all of said basket legs for effecting translational movement of at least one of said basket legs with respect to said slide.

5 30. The medical retrieval device of Claim 29, wherein
said means movably mounted to said slide and operatively
associated with all of said basket legs for effecting translational
movement of at least one of said basket legs with respect to
said slide comprises a pair of hubs movably mounted to said
slide, at least one of said basket legs being operatively
associated with one of said pair of hubs, and the remaining legs
being operatively associated with another of said hubs.

10 31. The medical retrieval device of Claim 27, wherein
basket legs other than said at least one basket leg that is
operatively associated with said moving means are fixedly
attached to said slide.

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